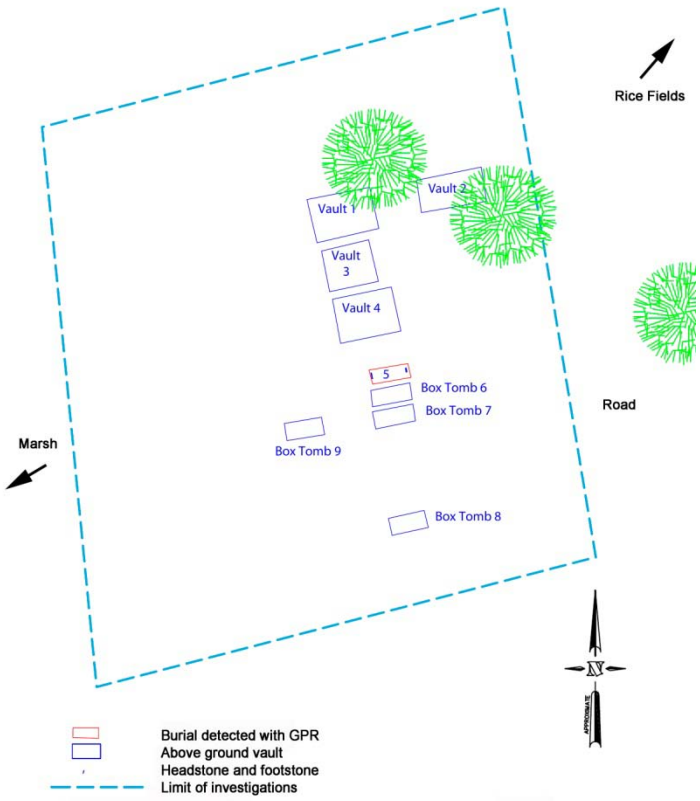
Brief Summary of Investigations at the Orton Plantation Burial Ground

Work at the Orton Plantation Burial Ground, on a narrow sand ridge about 1,300 feet north of the Orton Plantation house, began in 2012. The initial effort included the use of ground penetrating radar (GPR) to determine if there might be additional graves in the immediate area of the cemetery that had been lost over the years. This work revealed that there were no graves other than the four brick vaults, three brick box tombs, one marble box tomb, and one grave marked with a marble head and footstone.

An effort was also made to identify any historic documents that might help us better understand the cemetery and, especially, the various activities which took place there. Very little could be found. A 1917 account revealed that the roof on the largest brick vault had fallen in ("Pilgrimage to Old Brunswick," *The Orphans' Friend and Masonic Journal,* Oxford, NC, April 20, 1917).



Plan of the tombs and burials at the Orton Plantation Cemetery.

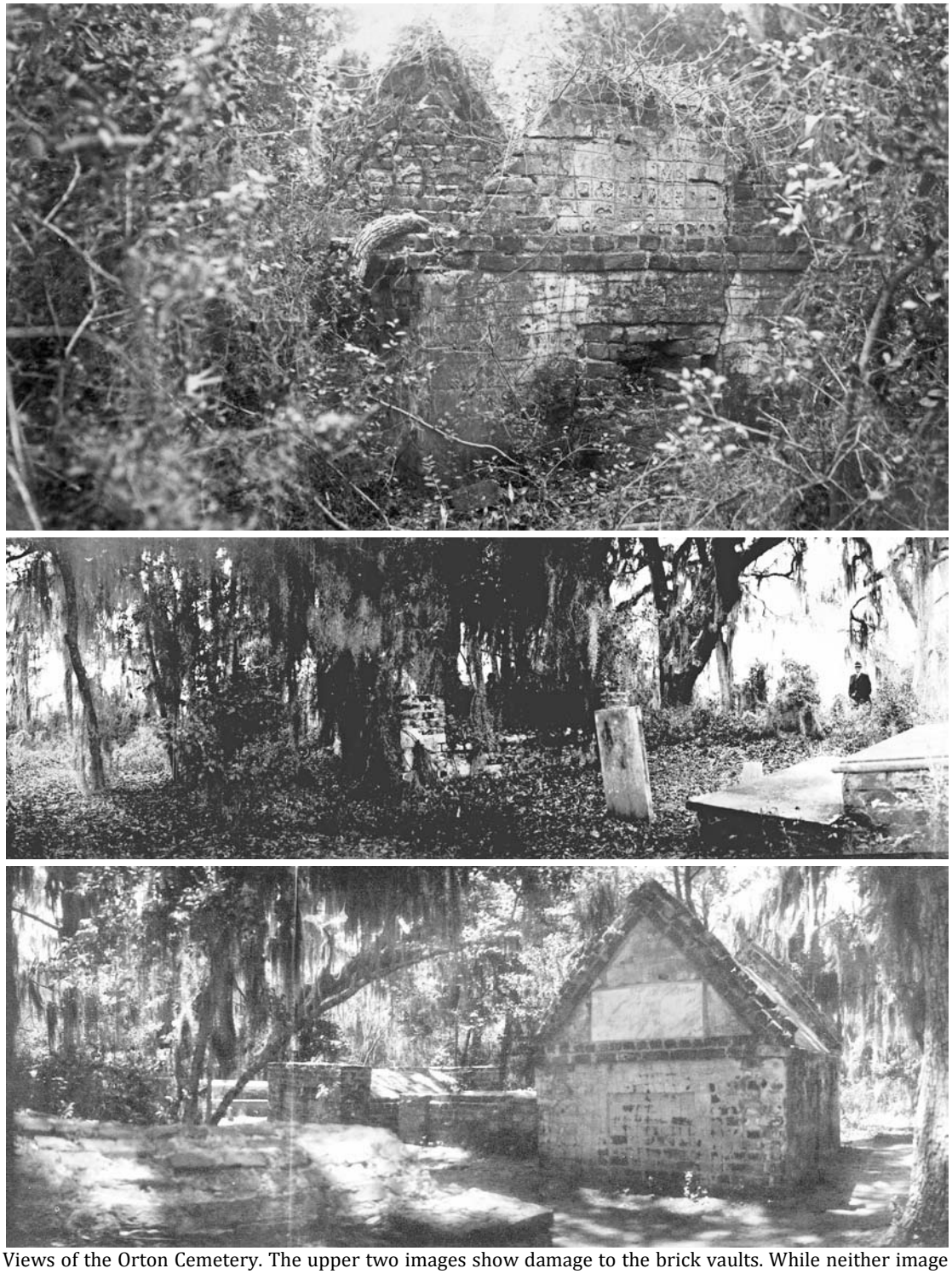
This is verified by a photograph showing Vault 1 with its roof collapsed inward. Many of the period photographs show the cemetery completely overtaken by undergrowth, such as the panoramic photo by Louis Moore in the first quarter of the twentieth century. It is likely that the vegetation changed and the tombs were repaired in the 1940s when the gardens were expanded. At least one additional photo shows the graveyard after this repair effort.

Oral tradition has held that Roger Moore was buried in the northernmost vault (Vault 1). This may be based on this vault being the largest and most impressive of the four at Orton.

Subsequently, an assessment of the vaults and box tombs found that many of the tombs were suffering from the use of hard Portland cement mortars in previous repair efforts dating at least into the late 19th century. These mortars, far harder and less porous than the bricks, were found to be causing damage to the bricks. This hard mortar needed to be replaced with a soft, high-lime mortar, similar to what would have been used during the original construction of the various monuments.

Consequently, an initial effort was designed to clean, repair, and restore different tombs in the cemetery.

Chicora Foundation, a Columbia, SC-based heritage preservation organization with over 30 years experience in cemetery preservation was selected to conduct the necessary work.



Views of the Orton Cemetery. The upper two images show damage to the brick vaults. While neither image is dated, both suggest they were taken in the first or second quarter of the twentieth century. The upper photo, looking at the rear of the tomb on the northern edge of the cemetery. The middle image is looking from the rear of the cemetery to the north-northeast. The final photograph, likely from the 1950s, shows that collapsed vaults had been repaired and a marble plaque had been mounted on the east façade of the large Vault 1 (far right of this image). Vault 2 is in the foreground and the view is looking west-southwest.

An initial step was to obtain chemical and petrographic analyses of the mortars and stucco originally used in the construction of the box tombs and vaults. For example, at Vault 1 the original mortar and stucco consists of a major amount of hydraulic hydrated lime and residual glass silicate particles which are similar in appearance to residual hydraulic lime, possibly Roman cement. Roman cement is a mixture of hydraulic, slaked free lime, and volcanic ash, or a calcined clay with hydraulic lime. The sand consists of limestone, quartz, and orthoclase feldspar.

In contrast, the mortar and stucco from Vault 4, at the south end of the vault row, consist of hydraulic hydrated lime and there is evidence of slaked lime putty in both samples. There is no evidence of Roman cement. While the binder was very different, the sand consists of quartz, orthoclase feldspar, and a low amount of limestone – a mix very similar to Vault 1.

With this information in hand, a replacement mortar was chosen that closely matched the original mortar. While lime putty could have been used, its very slow cure and need for frequent misting made it a difficult choice at the isolated cemetery. Instead, a natural hydraulic lime (NHL) mortar was chosen. Three different grades of aggregate were specified, since the brick work exhibited tremendous variation in joint width. It is likely the original masons intended for all of the brick work to be covered in a stucco. Since the brick would not be visible, there had been little effort to achieve a consistent or beautiful masonry bond.

Vegetation growing in mortar gaps was carefully cut out and the masonry was cleaned using a biocide that had been specifically developed for monuments such as these.

Next, the hard Portland cement mortar was carefully cut and chiseled out of Vaults 2, 3, and 4. Bricks damaged by mortar deterioration were replaced where possible. New NHL 3.5 mortar mix was carefully installed.

Several problems were encountered. Vault 2 had a large hole in the arched roof. Vault 3 evidenced a similar repair that was found to be failing. Vault 1 generated considerable concern since the gable roof appeared to have several cracks and the structure stability was uncertain. In each case repair – or even investigation - would necessitate entrance into the vaults.

Before anything further was done, a structural engineer was brought into the project and a thorough assessment of Vault 1 was conducted. This work determined that there are issues with the current roof, but that roof rehabilitation would not be possible without complete reconstruction. Efforts to probe to verify conditions or install additional anchors, or local repairs such as replacement of cracked roof bricks, could destabilize the roof, resulting in collapse. Consequently, a very conservative treatment approach has been adopted at Vault 1, with only wall mortar being removed and replaced.

The decision to conduct assessments and repairs of the vaults, however, provided an exceptionally rare opportunity to examine remains that might be present. The recovery of these remains was of course critical to prevent their damage by repair efforts.

Vault 1

This is certainly the most impressive of the vaults, having not only a larger footprint, but also being the only vault at the cemetery with a tall gable roof and gable pediments. It has been ascribed as the last resting place of Roger Moore, even having a marble plaque attached to the vault in the mid-twentieth century making that claim. The reasoning behind this attribution is almost certainly that it is the most impressive and it was assumed that the most impressive must be that of the fabled “king.”

Our study revealed that while several individuals had been moved into the vault during repairs of Vault 3, the only original occupant was a female, interpreted as a probable sister of Roger Moore.

When opened, the vault produced a very large quantity of wood remains associated with the most recent roof repair efforts. Below this wood was abundant brick. The very high incidence of rubble is thought to be the result of at least two separate repair efforts. In addition to the most recent – when little of the rubble was removed – there was a much earlier effort that involved removing as much of the coffin wood and all of the readily identifiable human bones to the eastern edge of the vault. While human bone was found elsewhere, they were only small fragments that could be easily overlooked in the soil.

In addition, we found significant portions of two additional individuals that originated in Vault 3, but which were moved into Vault 1 and comingled with the one occupant of Vault 1. We presume this move was necessitated by repairs to Vault 3 that took place sometime in the late nineteenth or very early twentieth century; perhaps even at the same time the initial work was being performed on Vault 1. For whatever reason the individuals from Vault 3 were never returned – likely because the laborers simply didn't know who belonged where after the work was completed.


A portion of the coffin wood from Vault 1 showing the shoulder of the coffin and its decoration with brass tacks.

Burial artifacts include coffin wood, identified as pine, iron tacks that were used to hold fabric on the interior of the coffins, brass tacks used to decorate the exterior, coffin nails, and iron coffin handles. The coffin wood revealed that at least one of the coffins was hexagonal in shape (often called a "toe pincher coffin").

A small fragment of bone from the one individual known to have been interred in Vault 1 was radiocarbon dated. This individual died either very early in the Moore tenure (prior to 1730) or after the Moore's lost control of the plantation (after 1830, although perhaps as early as 1815). Absent better genealogical data, the precision of radiocarbon dating is simply not sufficient to allow a tighter time frame for the use of the vault.

The single skeleton originally placed in this vault was that of a 43-71 year old female. The most notable forensic feature was that the individual had Spina Bifida Occulta, a mild form of Spina Bifida found in 10-20% of the population (although it may be found more commonly in families with a history of the problem). The DNA results demonstrated that this individual shares the same matrilineal DNA as Roger Moore and thus we assume, given the individual's age, that it was a sister.

Vault 2

Located toward the marsh from Vault 1, there is no institutional history associated with Vault 2. Our study, however, revealed that the tomb included a teenage boy and four infants. Upon excavation we found that this vault was filled with nearly a foot of soil, perhaps a result of periodic flooding and the large hole in the roof. Artifacts included coffin nails, pine coffin wood, iron tacks, decorative brass tacks, and coffin handles.


One of several styles of coffin handles found in Vault 2.

No bone was dated from this vault, but coffin wood suggests the vault was likely used between 1780 and 1800. This places it at the end of Roger Moore's ownership. This seemingly late date may explain why this vault was constructed as a second row, east toward the rice fields.

The young boy in Vault 2 was between 15 and 20 years old, also exhibited Spina Bifida Occulta. He was between 5'5" and 5'6" in height. In addition, DNA tests revealed that he shares the same matrilineal DNA as Roger Moore. Given his young age, this may be a child of Roger Moore. He was very gracile, tall and thin, with straight, healthy teeth.

Relatively little can be discerned about the four infants. Two were between 12 and 18 months. These infants share the same matrilineal DNA as Roger Moore and both exhibit what is known as "bottle mouth" – tooth decay caused by bottle feeding rather than nursing. One of these infants was a female. The third infant found to share the same matrilineal DNA as Roger Moore was 16-32 months of age at death. The fourth infant, between 6-18 months, has no maternal relationship to Roger Moore.

Vault 3

Vault 3 is situated south of Vault 2 and north of Vault 4, in the northern cemetery area. Its barrel arched roof is similar to Vault 2. Family tradition provided no information on who might be buried in the vault, but our study revealed that the tomb included two individuals: a middle aged to older female and an infant.

Upon opening this vault we found a floor consisting of brick and mortar rubble, a few fragments of recognizable wood, and occasional bone fragments. The low density of bone or artifacts in this tomb is explained by the remains having been removed and deposited in Vault 1 during a repair episode at Vault 3.

Radiocarbon dating of a small bone fragment reveals that the adult burial in this tomb took place between 1735 and 1800 – a very wide range.

The skeletal remains include a 43-71 year old female with possible Spina Bifida Occulta. The DNA research reveals an individual with no maternal relationship to any of the adults or children at the Orton Cemetery. We believe, based on these DNA results, the age of the individual, and the radiocarbon dating that this is likely Katherine Rhett, who died at Orton in 1745.

Also present was a 16-20 month old female infant. DNA reveals that this infant has no material relationship to the Moore adults.

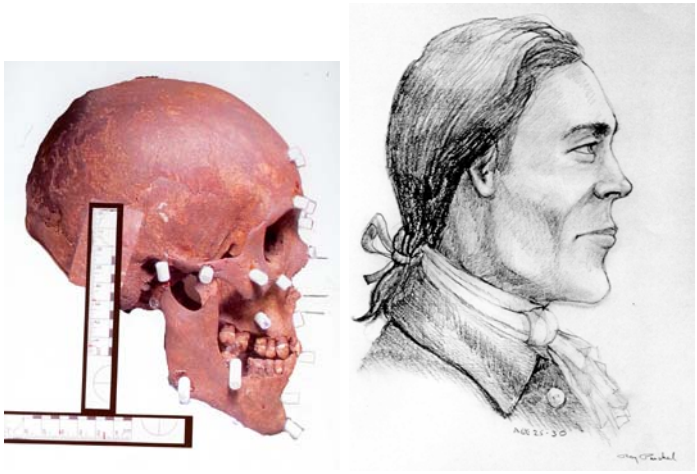
Vault 4

Vault 4 is situated in the middle of the cemetery at the south end of the row of vaults and just north of the burials of more distantly related family members. It is similar to Vault 1 in that it has a gable roof although it possesses a west facing arched opening similar to Vault 3. The tomb is unmarked and family legend provided no information on who might be buried in the vault.


Skeletal remains visible with the opening of Vault 4.

The early photographs suggest the vault was in generally good condition and certainly did not suffer the damage observed for Vaults 1, 2, and 3. Historically, attention has been directed to the largest vault at the north end of the line (Vault 1) as the presumptive burial location of Roger Moore and Vault 4 has attracted very little attention.

Our study revealed that the tomb included a single male, aged between 44 and 63 of age. This research demonstrates that the remains in Vault 4 are almost certainly those of "King" Roger Moore, buried in 1751.



Process of using the skull from Vault 4 to create a forensic reconstruction of a young Roger Moore.

Unlike those in other tombs, these remains had never been disturbed by flooding or repairs. The remains were extended, with the head to the west, and were carefully laid out on the south side of the tomb, as though an additional burial in the tomb had been anticipated (likely that of Moore's third wife, Mary Jones). This second burial, however, never took place since she moved off the plantation and died elsewhere in North Carolina.

Coffin wood was pine and it is interesting that several styles of handles were used on this coffin, suggesting that the death was somewhat unexpected and local sources did not have an adequate stock of matched handles. Moreover, while the other coffins in Vaults 1-3 appear to be very standardized, as though made by a local furniture maker, the coffin for Roger Moore was more likely made on the plantation and lacks much of the decoration seen in later examples.

The single individual in Vault 4 was between 44 and 63 years of age at death and like others at the plantation, evidenced severe Spina Bifida Occulta probably resulting in moderate to intense back or leg pain. DNA analysis revealed that he shared the same matrilineal DNA as Mr. Bacon's cousin on Hilton Head Island. There could be no direct match with Mr. Bacon, as his relationship to Roger Moore is through Mr. Bacon's mother, thus nullifying the DNA sequence.

This individual had lost four molars to decay many years prior to death, but otherwise had perfectly straight teeth with only four small cavities. A lower incisor had been missing, probably due to injury, for so long that the other teeth had moved into place to create a visually perfect smile. He stood between 5'4" and 5'10".

Part of the forensic examination revealed that the individual did not harbor intestinal parasites such as *Ascaris*, a roundworm, or *Trichuris*, the whipworm. This is somewhat unusual, suggesting good hygiene at the plantation. Further analysis revealed that the individual in Vault 4 apparently had a full meal shortly before his death, based on the quantity of meat and plant material present in the gut.

Additional analysis is being conducted to determine lead levels in the bones of the four adults at the Orton Cemetery. Since colonial and early antebellum soil and water lead levels were low, the only source for elevated lead levels – should they exist – would be lead glazed ceramics or pewter plates.

Summary

While there were five infants buried in the Orton vaults, the health of the adults was excellent. Except for Roger Moore, the Spina Bifida Occulta likely produced little more than lower back pain. While teeth exhibited the wear typical of abrasive foods (such as stone ground grains), there were few cavities. There was no evidence on trauma on any of the remains and the one individual tested from parasites revealed that plantation hygiene was likely good. The DNA evidence is providing an exceptional view of a family cemetery

and has successfully identified Roger Moore and, we believe, his second wife, Katherine Rhett. The investigations have clearly disproven the legend of where Roger Moore was buried and the research has helped better explain the decline that took place in the condition of the vaults over time.

But the exceptional benefits of this research do not end there. These investigations are the only archaeological investigations of colonial or early antebellum vaults in North Carolina and the population being studied is one of the very few colonial families in the South to receive this level of investigation. With the publication of the final report, Orton Plantation will have made an exceptional contribution to the bioanthropology of North Carolina's early European population.